

University of Groningen

Moral Responsibility for Large-Scale Events

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Published in:
Moral responsibility and the financial crisis

DOI:
[10.1111/misp.12090](https://doi.org/10.1111/misp.12090)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
Publisher's PDF, also known as Version of record

Publication date:
2018

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

de Bruin, B. (2018). Moral Responsibility for Large-Scale Events: The Difference between Climate Change and Economic Crises. In PA. French, HK. Wettstein, J. Dempsey, & T. Sorell (Eds.), *Moral responsibility and the financial crisis* (pp. 191-212). (Midwest Studies in Philosophy; Vol. 42). Wiley-Blackwell.
<https://doi.org/10.1111/misp.12090>

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Moral Responsibility for Large-Scale Events: The Difference between Climate Change and Economic Crises

BOUDEWIJN DE BRUIN

1. INTRODUCTION

The claim I defend in this article is this: With some few exceptions, no one can be held morally responsible for the global financial crisis that started in 2007. Or a bit more precisely: a received and a novel approach to individual moral responsibility, and two plausible candidates for collective moral responsibility, allow us to assign responsibility to only a small class of people or corporate entities.

This claim will strike many as *prima facie* highly implausible. Even though there is a fair amount of disagreement between people about whether an individual can be held morally responsible for climate change and environmental degradation (the car driver may or may not be responsible), there is very little disagreement about individual moral responsibility and the global financial crisis (at least some bankers and/or banks are, most people think, responsible). It is, therefore, important to qualify the scope of my claim and the argumentative strategies I use, as well as the underlying aim I have with this article.

To start with the latter, the bigger aim of this article is to see how various concepts of moral responsibility fare if applied to large and complex phenomena such as a financial crisis (or climate change). One might think that the literature on moral responsibility and climate change offers the tools needed to approach this generally. But as I show in this article, finance offers

DOI: 10.1111/misp.12090

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a number of additional and puzzling complexities. To establish this, I choose two concepts of moral responsibility that reach different conclusion regarding environmental degradation, and show that they yield (almost!) the same conclusion regarding finance. I pit a fairly received concept used by such authors as Baylor Johnson (Johnson 2003) and Walter Sinnott-Armstrong (Sinnott-Armstrong 2006) against a contending approach pioneered by Matthew Braham and Martin van Hees (Braham and van Hees 2012).¹

It is perhaps tempting to retort that a far more plausible account of moral responsibility for large-scale events should zoom in on *collective* rather than individual responsibility. This is indeed tempting, but I don't think it would help. I discuss two of the most prominent accounts (one based on plural subject theory, the other using the discursive dilemma), and argue that both fail for reasons that probably generalize to other accounts of collective responsibility.

Some disclaimers are in place. First, finance is extremely diverse, and I cannot hope to defend my claim by individually considering risk managers, attorneys, communications officers, traders, analysts, cashiers, depositors, mortgage borrowers, and so forth, or the teams or corporate entities they comprise. That is why I focus on key participants in the main causes of crises: traders in bubbles. Sadly, however, economists only have limited knowledge of the causes of bubbles and crises, and this makes any assignment of moral responsibility in finance tentative. Even though I only use well-corroborated models that are widely held in high regard by economists, progress in economics might force me to revise my arguments at some point.

Again, let me concede at the outset that there will be some exceptions to my claim: some individuals and teams will of course turn out to bear moral responsibility for large-scale events. If my argument didn't allow for such exceptions, it would be vulnerable to an easy *reductio*; for clearly some mortgage brokers, credit rating analysts, central bank employees, economists, supervisory authorities, traders, house owners, business school professors and politicians (to name a few) lied or misled customers or salespeople, mismanaged funds, deliberately employed skewed asset-pricing models, failed to listen to potential informants, and manipulated markets. I certainly don't want to deny the significance of these exceptions. I believe that much too little has been done so far to bring wrongdoers to justice. But their number is fairly small, and an analysis of their responsibility is unlikely to yield insights with broader philosophical relevance. That is why I don't consider them here.

I proceed as follows. In Section 2, I consider individual responsibility. I briefly introduce the relevant factual background (economic models of the crisis) and the two competing conceptions of moral responsibility. Discussing two cases (of a private and an institutional investor), I show that the received approach holds no one responsible. Applying the novel account due to Braham and van Hees (2012), however, leads to the perhaps surprising conclusion that the private investor, rather than institutional investors, is morally

1. Surely one might think that still other concepts of moral responsibility would lead to different verdicts. But I believe that my argument extends to many alternative concepts.

responsible for the harms resulting from a bubble's bursting. In Section 3, I consider plural subject and discursive dilemma approaches to collective responsibility, and show that neither of them works. In Section 4, I critically examine the principle that wherever there is harm there is someone who must bear the blame, and I also consider the role of regulators and governments.

2. INDIVIDUAL RESPONSIBILITY

It is standard in economics to distinguish the run-up phase—the bubble—from the actual crisis. Using Hyman Minsky's (1982) widely used terminology, the run-up phase consists of five "moments." The first is *displacement*, where innovation changes expectations among investors. Innovation may be technological (think of the advent of the railroads in the United States and the subsequent railroad bond bubbles), but it may equally be financial innovation, often spurred by regulatory change (such as the development of securitization before the global financial crisis). Then, investors start buying new assets, leading to a *boom*. It is here, or in the ensuing third moment of *euphoria*, that the price of the assets will start surpassing their fundamental value; they will become "overpriced." Some investors may already suspect a bubble, and may try to pass on the assets to "another fool," as popular parlance has it, but only in the fourth moment of *profit taking*, rational or "sophisticated" investors will start selling their assets consistently, which sooner or later triggers a *panic* where everyone tries to dump the assets.

The subprime mortgage meltdown offers an illustration. Low interest rates, financial innovation (mortgage securitization in the form of asset-backed securities), and a global savings glut gave rise to a real estate bubble that started bursting in 2007. This is where the global financial crisis began. Crises are typically caused by small events. The subprime mortgage market amounted to only 4 percent of the entire mortgage market. How can a small bubble cause such a harmful crisis? The received answer is that small events cause crises in the presence of amplification mechanisms. A small event may have *direct* spillover effects owing to contracts between individuals or organizations "inside" and "outside" the event. If, for instance, a subprime borrower defaults on her mortgage and is declared bankrupt, some of her creditors (say, the plumber or vendor of a new sofa) may incur losses because they have to write off the debt. If a vendor happens to have done business with many defaulting subprime lenders, the vendor may have to file for bankruptcy herself too, which may in turn entail that she is no longer able to discharge her contractual obligations vis-à-vis still other individuals. And so on. But small events may also have *indirect* spillover effects. Here, the amplification operates through prices. If subprime loans start defaulting more than expected, the price of mortgage-backed securities decreases, perhaps even to the point of a so-called *fire sale* where they are dumped on the market. As a result, the financial position of owners of such securities will *ceteris paribus* decrease. If you own such securities, even if you are totally unconnected to the events that caused the fire sale, the value of your assets (and so your "net worth") decreases.

Case 1: Selling Your House

You have been lucky enough to find a permanent job in a small university town that you really enjoy. You are renting a flat, but consider buying a house since you have become convinced that you want to stay in this place for at least the next ten years. You find a nice house at a convenient distance from where you work, which you decide to buy. After two or three years, you start noticing that the local newspaper publishes articles now and then that claim that house prices in your town (and country) have been too high in the last five years. They make clear that a significant drop in price is expected sooner or later. You find this plausible because two houses in your neighborhood were recently sold for about 20 percent more than you paid for your very similar house. You are concerned that in a few years from now your house may be worth less than what you paid for it. You realize that this would make it difficult or even impossible to move to a different place in the next five years or so, and even though you don't want to do that, the mere thought that your options might be limited makes you nervous. After a third house in your neighborhood is sold at a high price, you decide to put your house on the market. It sells shortly after, 35 percent above what you paid for it. You repay your mortgage, save the rest, and rent a nice flat. Not even a month later, you read that house prices have started plunging. One of your former neighbors, an elderly woman that had moved into the neighborhood a decade ago, had to put her house up for sale as she was moving into a retirement home. She sold it at 80 percent of what she paid for it ten years ago.

Are you morally responsible for your neighbor's losses?

Here are the key elements shared by the two concepts of moral responsibility I discuss in this article. An agent *S* is responsible for selecting action *A*, resulting in a state of affairs *C*, whenever three conditions are satisfied:

- (i) *Autonomy*: *S*'s performing *A* must be the result of autonomous, voluntary, and intentional choice;
- (ii) *Causality*: *S*'s performing *A* must be (part of) a cause of state of affairs *C*;
- (iii) *Alternative*: *S* must have had the opportunity to select an alternative action *B* evading *C*.²

Your selling your house is certainly the result of autonomous, voluntary, and intentional deliberation. You considered the matter intensely and rationally. There was no force or compulsion, nor were you under the sway of any cognitive or behavioral biases when you sold your house. So, the first condition is unproblematic. It is less clear, however, whether selling your house was a relevant causal factor explaining why your former neighbor sold her house at a significant loss. An answer to that question will depend on the explanatory model (a question for the economists) as well as on the concept of causality (a philosophical question that the received and the contending approach to moral responsibility used in this article disagree on).

2. Surely, there are many different accounts of responsibility, but I'm going to ignore that here. See Tognazzini (2013).

Explanatory Model

Now the question about economics already causes some trouble. For an economist wedded to the view that economic behavior must be explained through models postulating rational agents only (maximizing their expected utility), bubbles seems impossible to understand. This is why: In a bubble, the price of an asset surpasses its fundamental value, a concept meant to capture the asset's intrinsic value, typically defined as the sum of future cash flows the asset generates, discounted to the present.³ Each rational agent sees that no one wants to own an overpriced asset at a point in time t after which there will be no opportunity to trade any further. But then, a rational agent will argue, this asset cannot be overpriced at a point in time $s < t$, because no rational agent would want to buy it for that price at s . Reasoning backwards, it becomes clear that there won't be any moment where an asset is overpriced, that is, exceeds its fundamental value.⁴

Yet rationality doesn't so easily absolve an agent from moral responsibility. More sophisticated models show that bubbles may arise out of the joint actions of rational and irrational agents (or even among rational agents only) if uncertainty is introduced. In such models, these bubbles arise if rational agents are uncertain about the presence and behavior of potentially irrational investors, or about whether the price of an asset is greater than its fundamental value (and also when they are uncertain about whether other rational investors are uncertain about these things). In such circumstances, rational investors may find it worthwhile to buy and hold assets during what they perceive as a bubble, at least for some time, because they may expect two sorts of investors to hold on to the asset for even longer: rational investors that were slower to realize the overpricing, and irrational investors that are unaware of the overpricing. Such investors, in sum, try to "calculate... the madness of people," as Isaac Newton once said.⁵

A simplified model of a bubble therefore looks as follows:

- (i) The price of a certain asset M increases over time, surpassing its fundamental value at point in time t ;
- (ii) At some point $t + \delta_1$, the first investor becomes aware of the fact that M is overpriced, until at $t + \delta_n$ all n rational or sophisticated investors know M is overpriced;
- (iii) The price of M continues to rise up to a point $t + \varepsilon$ with $\varepsilon > \delta_n$, with increasingly many investors selling M , so that after $t + \varepsilon$ it drops sharply, bursting the bubble. Here also unsophisticated investors will know about M 's being overpriced.⁶

3. Estimating fundamental value is notoriously difficult due to uncertainty about the future cash flows and the interest rates to be used for discounting.

4. Formally, this is a so-called *backwards induction* argument based on common knowledge.

5. Newton is said to have remarked that "I can calculate the motions of the heavenly bodies, but not the madness of people," but the attribution is disputed. There is no doubt, however, that he lost part of his fortune in the South Sea bubble of 1720.

6. This is closely inspired by the model of Abreu and Brunnermeier (2003).

But what explains why prices start plummeting at $t + \varepsilon$? Prices reflect supply and demand. My selling an asset marginally depresses its price. Up to $t + \varepsilon$, the effect of my selling M is offset by a larger demand for M . At and after $t + \varepsilon$, however, rational investors (and later, we may assume, most other investors) attempt to get rid of M , depressing M 's price.⁷

Causality

If I sold close enough to $t + \varepsilon$, it may seem that I contributed causally to the bubble's bursting. But whether my contribution mattered for moral responsibility depends not only on the explanatory model, but also on what we take it to mean to make a causal contribution in relation to moral responsibility. Take, for instance, the received idea that for an agent to be a relevant causal factor, he or she needs to make a difference. Then, you are clearly off the hook, for you only sold one house. You didn't make the difference: even if you had decided not to sell your house, the crisis would still have hit, and your neighbor would still have lost money selling her house.

The idea that being able to make a difference is necessary for you to be morally responsible underlies typical judgments of responsibility for climate change, and it may be tempting to apply these ideas to other large-scale events. Authors such as Johnson (2003) and Sinnott-Armstrong (2006) have argued that a person's driving a car doesn't make her morally responsible for environmental degradation. If their arguments are successful and applicable to finance, the conclusion is that you were not morally responsible for your neighbor's losses.

But things are less straightforward. The model that explains the causal contribution an individual car driver makes to environmental degradation is the tragedy of the commons.⁸ Such tragedies arise when individuals overuse publicly available but scarce resources. In the original idea, developed by Garrett Hardin (1968), *common* (Lat. *communia*) refers to a patch of land belonging to all members of a certain community, where farmers graze their cows, but where increasing numbers of grazing cows ultimately deplete the resources. Negatively answering the question of whether the individual farmer (or car driver) can be held responsible for the depletion, Johnson and Sinnott-Armstrong argue that it is unreasonable for the individual farmer or car owner to hope that by switching to alternatives (fewer cows, public transport, etc.) she would help saving the common or the planet. Their individual marginal contribution is too small, the argument seems to say, to make a serious contribution.

Johnson and Sinnott-Armstrong have, however, recently been challenged by Braham and van Hees (2012). These authors argue that marginal contributions do not free you from responsibility.⁹ They take issue with the assumption that

7. More precisely, it is a small time interval rather than an infinitesimal point in time.

8. The tragedy of the commons is a standard model of climate change. See, e.g., *The Stern Review* (Stern 2007).

9. It may seem their approach rides on an equivocation between being "partly" and "fully" responsible for something. I hope to show that theirs is richer and more complex, though.

for an agent S to be a causal factor for some state of affairs C , S has to have had a genuine alternative B that ensures that C does not arise. Arguing that that condition is too strong, Braham and van Hees propose to apply the NESS test (plus a criterion about Reasonable Alternatives that I'll discuss shortly).¹⁰

According to the NESS test, an agent S 's performing action A is a causal factor for C if and only if A was a necessary element of a set of conditions that are jointly sufficient to cause C .¹¹

It is not sufficient for you to be absolved from responsibility for C to claim that you had no opportunity to rule out C . You must show that there is an action available to you that would have avoided the outcome, had sufficiently many others concurred. A result of this is that, unlike Johnson and Sinnott-Armstrong, Braham and van Hees do find the car driver a causal factor for environmental degradation. The reason is that although his or her own decision not to drive a car does not avoid the negative effects of emitting carbon dioxide, it allegedly would if sufficiently many others adopted an alternative course of action (bicycles, public transport, etc.). Back to the case, then, following Braham and van Hees: that you sold your house is causally relevant to your neighbor's losing money. The argument is this: As the above model makes clear, a bubble arises when sufficiently many people start selling overpriced assets. One seller doesn't make a bubble burst, and two or three won't burst the bubble either. But at some point, the added seller does make the difference. So a house seller is a necessary member of a jointly sufficient set of people selling their houses, thereby causing the housing bubble to collapse.¹²

10. The NESS test is due to Hart and Honoré (1985), but may go back at least as far as to John Stuart Mill. The originality of Braham and van Hees's contribution is not so much the introduction of the NESS test. Rather what distinguishes their approach from others is that they have developed a general game-theoretic model that gives a precise account of moral responsibility in contexts in which your actions have consequences that depend on those of others.

11. With more precision, suppose each agent j performs action a_j with a resulting outcome C . Then, i 's performing a_i is causally relevant to C whenever there is a subset T of all agents satisfying the following conditions: (i) i is a member of T ; (ii) whatever actions the members outside T select, if all members of T select a_j , then C results; (iii) if all members of T stick to selecting a_j except for i , then the members outside T can select at least one combination of actions ensuring that C does not arise. If these conditions are met, whether or not T succeeds in causing C hinges on i .

12. It might look as though I implicitly assume that the tragedy of the commons is an adequate model of financial bubbles and crises. I don't. But bubbles do share one important characteristic with such tragedies: an individual agent's action leads to negative externalities on another agent's utility, and these negative externalities are not internalized by the agent. Formally, if some agent i performs an action a_i , and agent j performs a_j , then the utility for j will be $u_j(a_i, a_j)$, so that changes in i 's behavior lead to marginal externalities $\frac{\partial u_j(a_i, a_j)}{\partial a_i}$. It is crucial to note, however, that in finance these negative externalities operate through prices rather than through physical pollution, as in the example of the car driver. This has important repercussions for the question of whether moral responsibility entails blameworthiness (or whether morally responsible individuals should be held legally liable for these negative externalities). It has, I believe, higher *prima facie* plausibility to derive a rights infringement from physical damage than from depressed prices, for instance.

Alternative

You acted autonomously and intentionally, but whether you were a causal factor contributing to your neighbor's losing money depends on the concept of causal relevance. Following the received view of moral responsibility, you are already off the hook. The ultimate judgment about moral responsibility following Braham and van Hees, however, boils down to the issue of the third condition concerning the availability of an alternative.

Generally, any alternative doesn't suffice. The alternative should be reasonable, eligible, morally and/or legally acceptable, and so on. That you had an alternative is clear: you could have stayed in the house. Is that a reasonable alternative following Braham and van Hees? Let's quickly go back to their analysis of the tragedy of the commons. By grazing cattle (or driving a car), I contribute to the depletion of resources. Braham and van Hees give examples of situations where despite my being a causal factor, I am not morally responsible because I didn't have a reasonable alternative: "if not sending any of his livestock to the commons means that a farmer and his family will starve to death for lack of income or food, then it is not reasonable to demand that he do so" (Braham and van Hees 2012). Similarly, they say, it would be wrong to hold someone morally responsible for some amount of pollution if it were caused by them driving someone to the emergency room. "Frivolous" pollution, however, makes you morally responsible (Braham and van Hees 2012). They postulate, moreover, that what counts as (un)reasonable also depends on moral and legal customs: an action is unreasonable if it is ruled out by morality or law.¹³ In sum, for an alternative to be reasonable, it must not be an inadequate response to a situation that seriously threatens someone's health or life; it must be acceptable given sufficiently widely accepted moral standards; and it must be acceptable given the laws that are effective in the situation at hand. A result of this is that if some action is an *unreasonable* alternative in a certain decision situation, it is highly unlikely that agents placed in such a situation will choose that alternative because they generally try to avert life-threatening situations, and to avoid breaking moral and legal norms.¹⁴

Back to the case. Although in your neighborhood three people moved before you moved, most of your neighbors didn't sell their houses. The details of their decision situations may be a bit different from yours, but *grosso modo* there will be many similarities: most neighbors will, like you, have had no plans to change jobs or change places in the next five years or so. Most neighbors will have had some sense of house price developments, as many subscribed to the local newspaper. And all neighbors will, like you, have had some interest in avoiding a drop in their net financial position. So if you try to defend yourself by claiming that it would be unreasonable not to move,

13. I will here set aside the issue of whether this is always a plausible condition.

14. I should stress that this is an empirical claim. It doesn't follow from Braham and van Hees's definitions, but is consistent with them.

then you'll have to explain why so many people in your neighborhood (as well as in many others) chose to select precisely that unreasonable action.

I don't think that this can be consistently done. So, the upshot is that if you adopt a received approach to moral responsibility (such as those of Johnson or Sinnott-Armstrong), then you are not morally responsible for your neighbor's losses. With Braham and van Hees's approach, however, you are, because you made an autonomous choice to sell your house. Selling your house was a causal factor in decreasing the price of the house of your neighbor. The alternative of not moving was reasonable. So you are morally responsible for the neighbor's losses.

Case 2: Retirement Planning

Many people will find it decidedly counterintuitive to hold you morally responsible for your neighbor's losses, and point out that the condition of causal relevance that Braham and van Hees introduce is just too strong. Consider, then, the following case.

You are a fund manager for AgriPension, a pension fund actively managing the retirement plans of farmers and other workers in the agricultural sector. It is your task to analyze the ICT industry, and buy and sell securities. You have bought shares in a number of mid-sized software companies developing social media and cloud computing solutions for individual and business customers. After some time, you start noticing that professional magazines and the financial press publish news that earlier expectations about innovation in this area were probably overblown. The development of social media and cloud computing is hampered by stricter forms of regulation that make it difficult for mid-size companies to compete with large companies. With hindsight, asset prices in mid-sized ICT have been too high in the past five years, and a significant drop must be expected sooner or later. You find this plausible because you have witnessed a rather steep rise in price over the past years, and you become concerned that in a few years from now these assets may be worth less than what you paid for them. You realize that this would lead to significant losses that would make it necessary to downsize pension payments. When you see that several other large investors are starting to sell mid-size ICT stock, you decide to get rid of all such shares the pension fund owns. Not even a month later, the ICT bubble bursts. The pension fund UniPension, responsible for the pensions of university personnel, turns out to be too late, and loses about three quarters of the value of ICT stock. University personnel face lower pensions as a result.

Consider the three conditions of moral responsibility: autonomy, causality, and alternative. This case and the previous should lead to the same judgment concerning the first two conditions. In both cases, you acted autonomously, and their causal structures are identical (they are both bubbles). If we follow the received view and say that the causality condition doesn't hold, the conclusion should be that *a fortiori* divesting (selling) in the run-up phase of a

crisis does *not* make you morally responsible for the bursting of the bubble. To put it somewhat boldly: if an individual car driver is not responsible for climate change, then a trader isn't responsible for the crisis. This is undeniably a conclusion that many people find unwelcome, or at least unexpected. I'm not going to spend more time on it, though, and want to continue by looking at whether Braham and van Hees challenge the incumbent view here, too.

So does accepting Braham and van Hees's criterion of causal relevance commit us to the verdict that AgriPension's fund manager *is* morally responsible for the lower pensions of university professors? We shall see the answer is negative. There is an interesting twist once we move to the case of the professional or institutional trader: the pension fund manager does not have a reasonable alternative.

Alternative

The first observation is that there are many different types of investors. I make the simple distinction between private investors, who trade for their own profit and trade rather small amounts of money, and institutional investors, who trade large sums of money to make profit for other people. Institutional investors work for insurance companies, university endowments, pension funds, mutual funds, and the like. The fund manager from the case is a clear example. Her main task is to ensure a particular return, given a level of acceptable risk that is determined by the purposes of the fund (in this case arguably the long-term ability to pay out pensions requires stability and fairly low risk). A fund manager's activities are governed by legal obligations that are part of her contract with her employer, and reflect the content of contracts between her employer and their clients (the members of the fund). Some may argue that in addition to these legal obligations she is bound by moral obligations that arise out of the informational asymmetries between the fund manager and her clients, or from the relative vulnerability of the client, and so on (in the jargon, these might be the fiduciary duties agents have vis-à-vis the principals they work for).

Such fund managers buy assets for a variety of reasons. One reason is of course that shares may pay dividends. An often more powerful reason is to generate returns by buying now and selling later. Suppose you believe that XYZ stock is underpriced at the moment. If you buy now, then when others have also become aware of the true value of XYZ (and the price has risen compared to when you bought it), you have made a gain for your clients. But dividend and expected returns don't exhaust the fund manager's reasons. Every fund manager will also buy a variety of assets simply because she wants to *diversify* the portfolio. Diversifying decreases risk. It is better to have shares in two food companies than in one, and it is even better to have shares in these two food companies plus a pharmaceutical company, and so forth.¹⁵

15. The standard analogy to explain is that you shouldn't put all your eggs in one basket (see, e.g., Fabozzi, Modigliani, and Jones 2009 for a textbook explanation). There are various other reasons for buying or selling securities, such as legal or moral proscriptions against owning stocks (or bonds) of certain characteristics. I ignore these factors here.

A fund manager will have to make buying and selling decisions concerning many different shares, and even though she will continuously monitor the composition (diversification) of her portfolio, it is practically impossible that she can avoid buying assets that, at a later point in time, turn out to be overpriced (and as a result may be part of a bubble). So the question we need to answer is: Which *reasonable* options are available to an investor once she discovers at $t + \delta_i$ that she owns an overpriced asset M? There are two things to do: sell them, or hold on to them.¹⁶ Selling them may precipitate a bubble's collapse. This she certainly knows, and since she is an institutional investor she may even manage a sufficiently large number of shares for the selling of her positions in M to have an immediate noticeable effect on M's price. But as we learned from the earlier discussion of models of bubbles, the fund manager doesn't know whether other investors know about M's being overpriced. For all she knows, she may be early, average, or late. Of course she knows that *if* she is early, her selling M now is much less likely to lead to an immediate collapse than if she were the last to learn. But equally, she knows that if she holds on to the asset until after the bubble has burst, she will *not* have made a contribution to the bubble's bursting.

But is holding M a reasonable alternative? Above I argued that if an action is *unreasonable*, we should expect to find only a few people selecting it.¹⁷ The converse is not generally true. There are reasonable alternatives that few people select. Still, what happens if one imagines an action's being performed by many people or in many circumstances tells you something about its reasonability? Since the fund manager will have to deal with overpriced assets in the fund's portfolio fairly regularly, we can consider what long-term strategies she (and other fund managers) have at their disposal. Or, to hammer this point home, if we restricted attention to the individual case, we would risk losing track of the fact that fund managers adopt investment *strategies*, and that we should ask whether, as a general rule, the strategy of holding on to assets in light of information of them being overpriced is a reasonable strategy.

It isn't. An asset manager who never sells overpriced assets will in the majority of cases lose money—money that she is typically required by law to invest in the best interests of her clients. If clients learn that the fund is using the strategy of never selling overpriced assets, they will want to leave

16. Quitting jobs is surely a reasonable available option, but its availability doesn't show that the other options are unreasonable. If the only reasonable option available to a fund manager discovering she owns an overpriced asset is quitting jobs, financial markets would look very different. For if that is among the risks fund managers run, they would want to be compensated, or find employment in different industries.

17. You might wonder whether such things as large credit card indebtedness shows that many people are unreasonable after all. But Braham and van Hees' definition of reasonableness is more permissive than such concepts as economic rationality and prudence. If my empirical claim holds true, an unreasonable action is largely an action that is obviously threatening a person's existence, or illegal, or immoral. Taking on too much credit card debt is, then, a reasonable option according to this definition.

the fund.¹⁸ The fund will dry up. It doesn't make sense to invest in such a fund, because one is likely to lose one's money in the long run.

There is a further complexity. The fund manager is assumed in the earlier models to have gained *knowledge* about the difference between the asset's price and fundamental value. But knowledge is hard to get. More often than not, managers will be confronted with competing bits of evidence, which it is difficult to sort out. They may have some reasons to believe *M* is overpriced, but there may also be evidence that the innovations in the respective company are so radical that it is almost impossible to estimate future cash flows. So is *M* really overpriced? If the fund manager announced that she will hold on to an asset once she gets some evidence that it is overpriced, she will probably stop trading, because there is very often at least some evidence backing any asset's being overpriced. Then, she will no longer be running an actively managed fund, but a passive collection of shares, just like an index fund. Clients will walk away, because they will want to move their money to a much cheaper index fund. (They don't want to pay fees to the fund manager for doing nothing.) That is why the general strategy holding on to assets that managers perceive as possibly overpriced is unreasonable for actively managed funds.

Back again to the case. You were morally responsible for the losses incurred by your neighbor when she sold her house, following Braham and van Hees. You weren't if you accepted the incumbent account. On both accounts, however, the fund manager fails to be morally responsible for the decreased value of the pensions of university personnel. What general conclusion should this lead to?

A philosophical analysis of cases has the advantage of allowing for a high degree of precision in argumentation. But cases have the disadvantage that they may only capture a small part of reality. There is, however, considerable reason to doubt whether that is going to be the case here. Most economists agree that it is primarily through bubbles that crises start. The details of the bubbles may be very different, but their structure is the same. That is why I believe that the results from this section support the claim that moral responsibility for the global financial crisis among finance professionals is much smaller than many have thought.

3. COLLECTIVE RESPONSIBILITY

That holding individuals morally responsible for the global financial crisis hardly ever makes sense may perhaps be less surprising if we note that most people work in teams (or larger groups) rather than individually, and that such groups might be meaningful carriers of moral responsibility. If this is right, a more successful account of moral responsibility for the crisis may emphasize groups rather than individuals.

18. In many countries, pension fund membership is involuntary. This raises the additional moral question of whether the fund manager's refusal to sell overpriced assets wrongs the fund's members.

My aim in this section is to lower expectations about such an account. I focus on two popular ways in which collective responsibility has been applied to business. The first is based on Margaret Gilbert's (1989) plural subject theory, which James Dempsey (in this issue) has used to argue that a banking culture prioritizing profit making over risk management should be held morally responsible for the crisis. The second takes the so-called *discursive dilemma* as its point of departure (Pettit 2007). A discursive dilemma is a situation in which a team selects a course of action (or brings a verdict on some subject matter) that its members do not individually support. If such dilemmas are common in finance, one might be led to think that collectives can be held morally responsible for outcomes for which individuals cannot.

Both lines of reasoning, however, are committed to making assumptions that are implausible on empirical and conceptual grounds; and while I could certainly choose other approaches to collective responsibility, I believe my arguments generalize sufficiently to undercut ascriptions of collective responsibility for the global financial crisis.¹⁹ Or so I argue.

3.1 Plural Subject Theory

Some definitions first. For a collection of people to constitute a *plural subject* there has to be common knowledge among them of the fact that all of them have openly expressed their quasi-readiness to engage in certain joint activities or to embrace, as a group, a particular set of values (Gilbert 1989). *Common knowledge* here refers to something being entirely transparent to all group members in the sense that all members know that it is the case, and also know that the others possess knowledge concerning it, that they know that they know it, and so on. Common knowledge is what typically arises when a member of parliament makes a statement during a meeting of a national assembly, where the architectural structure of the assembly room allows everyone present to witness not only the statement being made but also its being made "openly" in a way generating common knowledge among parliamentarians. The concept of *quasi-readiness*, in turn, captures the idea that someone is ready to perform her share of a joint action provided the others are quasi-ready too. When I would like to go see a film with you, I can express my quasi-readiness by saying such things as "Let's go to *Wall Street* tonight"; and if you respond by saying "Yes, let's do that," a plural subject with respect to going to the cinema has been formed instantaneously. This is not a mere play of words; creating a plural subject creates *joint commitments*. If I don't show up at the cinema, I have failed to discharge my commitment to perform my share of the joint activities of the plural subject.

19. Many other approaches to collective action exist, and I can't do justice to all. Seumas Miller (2010) has developed an alternative account of collective responsibility. He applies this to a very specific kind of wrongdoing: corruption in finance. Corruption is ruled out by law in most countries, so it is relatively unsurprising that some corporate entities are collectively responsible for corruption (if one assumes that collective responsibility is a sensible concept). By contrast, I focus on activities that are neither illegal nor clearly immoral, in particular asset trading.

I have failed to live up to what I committed to when I expressed my quasi-readiness and you accepted my invitation to form a plural subject.²⁰

Here are the main propositions I am going to reject: that within finance there are sufficiently many relevant groups constituting a plural subject collectively embracing the value of prioritizing profit over risk management; and that by habitually engaging in practices and activities revealing this value, people working in finance openly express their quasi-readiness to a joint commitment to embracing this value, thereby forming or joining the relevant plural subject. My argument is in two parts. First, I argue that common knowledge of the required sort is unlikely to arise. Second, I show that despite its initial plausibility, the claim that within finance profit comes before risk management is ultimately untenable.

The first part starts with the observation that common knowledge is unlikely to develop if people hardly ever interact. Your quasi-readiness to engage in certain activities and to accept joint commitments to embrace particular values has to be openly expressed. For sustained ascriptions of collective values, group members must have sufficiently many opportunities to create and reinforce their joint commitments to embrace these values. Now, most banks are large organizations with many branches and departments. Employees working at a bank's local branches are mainly concerned with mortgages, small and medium-sized business finance, and other small-scale services. At a bank's headquarter, traders, stock market analysts, accountants, macroeconomists, business experts, communications advisors, ICT staff, and many other workers are primarily focused on their own narrowly described roles. Consequently, most bank employees have very little interaction with each other.

This is underscored by the rigidity of most communication channels in banks. For instance, the design of a new financial product typically starts at the commercial side of the bank, only to move to the risk management and compliance departments at a later stage. A feedback loop generating common knowledge may result, but genuine cooperation between the commercial side of a bank and its risk management and compliance departments is fairly uncommon.²¹ If you insist on applying plural subject theory to finance, a more accurate way to describe a bank is to say that some plural subjects are committed to profit making, and others to managing risk. Moreover, there is no natural necessity to divide labor so strictly. Commerce, risk management, and compliance could interact more intensely. It is not clear, however, that even if we assume that in such a situation a genuine plural subject is established (with commitments vis-à-vis values), it would be one prioritizing profit over risk management. There is some empirical evidence that when organizational structures are more open, and when information concerning products, risks and compliance is shared more widely within teams or the bank as a whole, risk management gets higher priority not lower (Jorion 2009).

20. You may dispute whether such group concepts are necessary to explain my obligation to show up. It is not my purpose here to criticize Gilbert's theory of plural subjects. But see de Bruin (2009).

21. Strict separation of various communication channels is sometimes required by internal or external regulation.

It might be objected that I am forgetting an important plural subject: top management, the real decision makers. Products are designed, risks assessed, and compliance checked, but it is still up to management to decide what to do. Surely, a board of directors is a much more likely *prima facie* candidate for plural subjecthood. Moreover, it may indeed seem that in some finance firms, top management was excessively focused on collateralized debt obligations, structured investment vehicles, and other potentially risky products, and some such firms did indeed suffer larger losses during the global financial crisis than firms with more restraint.

Before proceeding, let me first underscore the difficulties measuring a firm's attitude toward risk management. Here is an instructive example. In 2007, the Swiss bank UBS lost \$19 billion on mortgage-backed securities. As René Stulz (2008) notes, such a large loss doesn't necessarily mean flawed risk management. A standard way of conducting risk management through value at risk (VaR) attempts to diminish risk by ensuring that potential losses exceeding a predetermined threshold magnitude will not manifest except in 1 percent of the cases (for commercial banks), and 5 percent (for investment banks). To find out whether VaR has been done right depends not on whether actual losses exceeding the threshold have manifested, but on whether they have manifested with higher than expected frequency. Assuming that there are 252 trading days in a year, excessive losses should be expected to happen during two to three days a year (or twelve to thirteen, if allowing for 5 percent exceptions). In 2007, UBS reported twenty-nine exceptions, where two to three would have been expected. It is that observation that supports the claim that risk management at UBS was flawed (Jorion 2009).

I now turn to my second point, and show why it is difficult to imagine a culture convincingly committed to prioritizing profit over risk management, even though individual managers may have had incentives to disregard risk management altogether. So my claim is that even if we admit that top management may figure as a plural subject, it would be too hasty to conclude that this shows that the directors of a firm form a plural subject in relation to the specific value of prioritizing profit over risk management.

It is instructive to compare the relationship between profit taking and risk management with that between profit taking and concern for the environment. The businessperson interested in profit at the expense of the environment is unfortunately a very real possibility. This is due to the fact that a concern for the environment is a genuine obstacle to making profit. Environmental care restricts the number of options you have, and as such potentially imposes costs on business.²² Profit making and risk management are in an entirely different relationship, however. The first and foremost principle in finance is that expected risk and expected return are related. If you

22. I'm not here denying the relevance of the long-term view in which a surviving planet earth is a necessary condition for conducting business. If a business destroys commodities needed to do business, concern for the commodities coincides with a concern for profit. The point here is that businesspeople caring for the environment will reduce the number of their options. Eliminating options never increases expected utility, and potentially decreases it.

invest in something more risky, you require that the expected return is going to be higher, because otherwise you would invest the same amount of money in something that bears less risk, but has the same expected return.²³

This means that you cannot sensibly discuss strategies to maximize (expected) profit without discussing risk. Inadequate risk management therefore on average leads not to profits, but to unacceptably many and/or unacceptably large *losses*, and that is why at the level of top management the importance of risk management should not be in dispute.

Now clearly bank directors may for all sorts of reasons ignore risk management. They may come from the commercial side of the firm and import a general dislike of risk managers. They may have personal stakes in ignoring these risks because of incentives created by erroneously designed remuneration packages. Or CEOs may falsely believe that their supposedly high level of expertise allows them to set aside the work of the Chief Risk Officer, who operates further down the board's hierarchy. Even in such cases, however, there is no plural subject of the relevant kind. There is no joint commitment among directors to ignore or downplay the importance of risk management. Rather, one or more members are individually committed to, for instance, gaming the system for their own personal benefit. Such directors do not *jointly* subscribe to a corporate goal (of prioritizing profit making over risk management). They probably assign no value to any corporate goals whatsoever. They are only interested in their own private monetary gains, and to the extent that this leads to harm, they are at most individually responsible.

3.2 Discursive Dilemmas

A device used more frequently than plural subjects in arguments about collective responsibility is that of the so-called *discursive dilemma*. Authors such as Philip Pettit (2007) and David Copp (2006) have used it to defend concepts of collective or corporate responsibility.²⁴ Among the ambitions these and other authors have with the discursive dilemma is to gain deeper insight in collective responsibility in real-life cases. Pettit, for instance, starts an influential article with the tragic case of the *Herald of Free Enterprise* disaster in the Belgian harbor of Zeebrugge. So, it is only natural to consider the potential role of the discursive dilemma in arguments about the global financial crisis.

The traditional setup of a discursive dilemma is one in which three members of a committee have to vote (yes or no) on three premises that are all necessary and sufficient for a policy to be implemented.²⁵ The dilemma arises out of the fact that while individually each committee member believes that only two of the three conditions are satisfied, each condition obtains a yes vote from two of

23. It is essential that in finance the risk of a particular asset is measured by its volatility rather than its expected payoff. Volatility is estimated by the standard deviation of historical returns of the asset.

24. It goes back at least as far as to Kornhauser and Sager (1986).

25. Pettit (2007) considers four propositions, but three are sufficient to get a three-person dilemma.

the three members. As a result, no member individually backs the policy, but each of the premises is backed by a majority of two. Since the decision rule used by the committee is stipulated to be such that it only requires majorities for the premises (a *premise-based* decision rule), the policy is implemented. Suppose now that some harm or wrong results from the policy's being implemented. Who is responsible? Pettit argues that it can't be the individual committee members, because each voted individually against the policy. So if you want to complain, you "can only blame the [committee] as a whole" (Pettit 2007).

Pettit's conclusion can be criticized on several grounds, but I'm going to assume here that he is right, and that whenever such "voids" of individual responsibility arise, they show that collective responsibility is at least possible.²⁶ In other words, it is particularly in situations such as the discursive dilemma that individuals lose, and collectives gain, moral responsibility. Yet I show that such situations are rare, particularly in finance.

The primary reason why discursive dilemmas are unlikely to arise in financial decision making is that most organizational decision making in real life is in boards, committees, or teams involving more subtle and fine-grained input from individual members than the binary yes or no vote. This point by itself is not decisive. Carl Andreas Claussen and Øistein Røisland (2010a) show that quantitative input generates discursive dilemmas just as easily. Their example is drawn from corporate finance. The board of a company votes on the question of whether to implement some policy. Each of the three members has personal estimates of two relevant measures: (i) the amount of money the policy would bring into the company (or more precisely, the discounted cash flow [DCF] of the project), and (ii) the costs incurred to start and realize the project (investment costs, IC). Given these two measures, the so-called *net present value* is calculated by subtracting the second from the first ($NPV = DCF - IC$). A project's NPV is a crucial measure frequently used in all sorts of business decision making. As a general rule, if several projects can be chosen, the one with the greatest NPV must be chosen.

Here is how the members A, B, and C voted.

	Discounted cash flow (DCF)	Investment costs (IC)	Net present value (NPV)	
A	10	8	2	
B	10	11	-1	
C	13	12	1	
Median	10	11	Premise-based -1	Conclusion-based 1

What NPV should the board "as a whole" assign to the project? This depends on two things. One is how the individual estimates of DCF and IC are aggregated into a board estimate. Claussen and Røisland use the median

26. One problem is that Pettit's argument seems to presuppose a principle that if some harm happens as the result of human activities or decisions, there must be someone or something that can be blamed. This is dubious in the context of finance, as I briefly note in the conclusion of this article.

of the individual estimates. Then, for the board, $DCF = 10$ and $IC = 11$, as shown in the bottom row of the table. The other issue is whether the board calculates the estimated NPV of the project based on these two figures (a *premise-based* decision), or applies the aggregation procedure (in this case, the median) to the values of the NPVs induced by the three individual estimates of DCF and IC (a *conclusion-based* decision). Following the premise-based procedure, the board's estimate would be $NPV = -1$, whereas the conclusion-based procedure would lead to $NPV = 1$. My argument proceeds on the assumption that whenever discursive dilemmas arise, the need to postulate collective responsibility arises also. So if Claussen and Røisland offer a plausible model of corporate decision making, to demonstrate collective responsibility for the global financial crisis only requires us to demonstrate one or more relevant discursive dilemmas. Yet there are two reasons why we should expect to find only a few such dilemmas. The first is that the example heavily depends on the fact that the aggregation procedure or decision rule is defined in terms of the median. As soon as the board switches to the mathematically more tractable mean (average), the dilemma disappears entirely.²⁷ I do not want to deny that some boards may have reasons to aggregate individual votes using the median rather than the arithmetic mean. But it strikes me as highly artificial in most contexts.

But secondly, even if boards aggregated through the median, in many cases the difference between the premise-based and the conclusion-based estimate will be very small or nil. This has to do with an assumption that generally underlies the discursive dilemma: that no board member is a "dictator." Consider a decision rule F that turns the individual estimates or judgments g_1, \dots, g_n of n board members into a board estimate or judgment $F(g_1, \dots, g_n)$. Then, F is *dictatorial* if there is some i such that $F(g_1, \dots, g_n) = g_i$ for any combination of estimates g_1, \dots, g_n . To assume that the decision rule isn't dictatorial may have some plausibility in environments where decision making is heavily regulated.²⁸ Board rooms are, however, a very different kind of environment. They are often dominated by a CEO that comes close to having dictatorial influence on the firm. Economists and business scholars have garnered sufficient evidence that the influence of CEOs on a number of output variables of their firms is much larger than we should expect if board decisions were the result of applying aggregate decision rules giving rather more equal weight to all board members.

Let me explain. Board meetings cannot in most cases be publicly scrutinized. But what can be done is to examine the extent to which particular characteristics of a firm's CEO explain firm behavior. These characteristics involve the remuneration package the CEO receives, certain psychological traits (for instance, the "big five" core personality traits: extraversion, emotional stability, agreeableness, conscientiousness, openness to experience).²⁹ What researchers consistently find is that these

27. For the (arithmetic) mean, it is true that the difference between two means equals the mean of the differences.

28. In another article, Claussen and Røisland (2010b) argue that this applies to monetary policy making.

29. See, e.g., Abatecola, Mandarelli, and Poggesi (2013) for a survey of the literature.

and similar CEO characteristics explain a fair share of the amount of risk a firm takes, its leverage ratio, the proportion of equity and debt by which the firm is financed, the interest rates the firm pays on its loans, its credit rating, and so forth.³⁰

I don't have space to develop my criticism of the discursive dilemma much further.³¹ The plausibility of my claim is, however, underscored by an observation about law and regulation: a large part of corporate governance regulation is meant precisely to make decision making in boards *less* dictatorial.³²

In sum, many plural subjects may form in finance, but few will explicitly value prioritizing profit making over risk management. Moreover, collective decision making in finance may sometimes assume discursive dilemma form, but the paradox between premise-based and conclusion-based decision making doesn't manifest itself but in rare occasions. Here, too, then the conclusion must be that with some few exceptions, no one is morally responsible for the global financial crisis.³³

4. MUST THERE BE SOMEONE TO BLAME?

That (almost) no one is morally responsible for the crisis may not only strike some readers as implausible. It may also create some frustration: if no one is morally responsible, whom should we blame?

My conclusion leads to such frustration if you embrace the principle that if something bad happens as the result of human actions or decisions, someone

30. See Bernile, Bhagwat, and Rau (2017) for a striking recent example. This article shows that CEO experiences with catastrophes during early life predict the amount of risk their firms take. The article offers a neurological explanation for the mechanism through which particular disaster experiences determine a person's attitude toward risk. For present purposes, this mechanism is unimportant. What is important is the observation that it is the CEO's attitude toward risk (and not a "collective" attitude toward risk determined through discursive dilemma type decision procedures) that accounts for (the variation in) these output variables.

31. It is important to note that the existence of "dictatorial" CEOs is compatible with highly formalized decision rules. The inordinate influence of CEOs on managerial decisions may be exercised prior to voting in a discursive dilemma setting: whenever CEOs successfully persuade other members to follow their vote, a nondictatorial decision rule will still yield dictatorial decisions. Clearly, if the CEO has the power to persuade a majority of members, no "responsibility void" will arise. It is not difficult to show mathematically that, with increasing influence of CEOs on other board members prior to voting, discursive dilemmas are less likely to occur.

32. An interesting example here is the prohibition in the United Kingdom of CEO duality, that is, of one person assuming both the role of CEO and of chairman (in charge of the nonexecutive part of the board). In so-called *two-tiered* boards, an executive board carries out daily decision making, monitored by the nonexecutive or supervisory board. This model is popular in several continental European countries. In the United States and the United Kingdom, there is only one board, which has executive and nonexecutive members. The CEO is the main executive; the chairman the main nonexecutive. It's easy to speculate that one-tiered boards offer more opportunities for dictatorship than two-tiered boards.

33. This brings us back to individual responsibility: CEOs wield great power over organizations, mostly for the good, but sometimes for the bad. Whether some of them are individually responsible for the global financial crisis depends on empirical details that I can't go into now. But it would surprise me if after close inspection of these details no board member would have to be held responsible.

must be blamed. This principle may be plausible in a large range of homely cases. But it is entirely unclear whether it makes sense in the context of finance.³⁴

I will not come back to that and only deal with another objection. It is to the effect that I'm ignoring the institutional background of finance. Laws, regulations, and conventions may determine when the preconditions of moral responsibility hold, because they shape the causal connections and the available alternatives that market participants have. I am keenly aware of this, and I believe that observations about how moral responsibility is distributed given a particular institutional framework can inform debates about how these institutions might be changed. Here is an example. Bubbles and crises typically arise in situations where investors have suboptimal information concerning the fundamental value of assets. Some information is disseminated through price. A rise in a price of an asset indicates *ceteris paribus* that expected future cash flows have increased. On a simple understanding, one investor obtains information about a new technology to be developed by a company. She expects the company to become more profitable, and decides to buy stock in the company, thereby marginally raising its price, and the more investors become aware of the news, the greater this effect will be.

For a price accurately to reflect the fundamental value of an asset, it is essential that all relevant bits of information are disseminated through price; and it is the institutional background that determines whether such information is available. Here is a slightly stylized example. Distinguish investors that are "optimistic" and "pessimistic," respectively, concerning some asset. An optimist wants to buy the asset. A pessimist wants to sell it. Optimists can keep on buying the assets as long as they have money, but unless the pessimists can sell short, the possibilities for disseminating pessimistic views through price stops as soon as they have sold all their assets. (A pessimist selling short would borrow the shares from someone, and then sell them to an optimist. The pessimist would need to give them back to the lender at a specified point in time, but if the pessimistic scenario materializes, she will simply *buy* them at a lower price than she first sold them, and then give them back to the lender.)

Short selling puts optimists and pessimists on an equal footing, and a result of this is that bubbles will be less pronounced—or are even prevented from starting. Yet many jurisdictions have strict rules against short selling, and a great majority of institutional investors have internal regulations against short selling in place (Hong and Stein 2003). In sum, regulators could ensure that fewer market participants become morally responsible for bursting a bubble by allowing pessimists to sell short.³⁵ Sometimes deregulation does help.

34. See, for example Davies (2010).

35. Even where short selling is possible, it may still be hard for pessimists to bring their beliefs to the market. In such markets as real estate, art, wine, and so on, it is difficult to short sell, even if it is legal. A solution may be the introduction of indices. Gary Gorton (2010), for instance, argues that the introduction of the ABX index in 2006, an index for asset-backed securities, helped bring about the subprime mortgage meltdown. Had that index been there a decade earlier, there might not have been a bubble in the first place. A potential problem is, as Tom Sorell has pointed out (personal communication), that short selling pessimists may create pessimism in other market participants. The extent to which this harms them is, however, hard to determine on the basis of existing empirical research.

Let me turn back to the principle that if something bad happens someone must be blamed. I only want to discuss an example that, hopefully, helps casting doubt on its applicability to finance. The example involves swap agreements between banks the price of which exploded in the week after the collapse of Lehman Brothers in September 2008. A swap agreement is a contract to the effect that you and I swap cash flows. For instance, we could agree that I will pay you a fixed interest rate of 3 percent on \$1 million, and that you pay me a variable interest rate on \$1 million, amounting to the LIBOR rate plus half a percent. Similarly, we might swap our exposure to the risk that, for instance, a certain company goes bankrupt. If I have lent money to that company, it might be interesting to me to pay you some amount of money until some point in time in exchange for the right to be paid back (by you) my loan to that company in case it goes bust (plus remaining interest).

Anecdotal evidence has it that in the week after Lehman Brothers went bankrupt, the largest US investment banks bought credit default swaps that would protect them against the risk of other investment banks going bust. This made perfect sense. In fact, it would have been utterly irresponsible not to insure themselves against these dangers: if ever it made sense to buy credit default swaps, then surely it was so in the week that started the global financial crisis. But the aggregate result of this was that the market for credit default swaps exploded, exacerbating rather than dampening the turmoil. Whom should we blame? I believe we should accept that no one can sensibly be blamed.^{36,37}

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36. What should we then do? Sometimes regulation might help. As Darrell Duffie and Haoxiang Zhu (2011) observe, with complete information about all positions taken by all investments banks, all parties should have seen that "multilateral netting" would have eliminated their exposures to default risk. A simple example is when A owes \$1 million to B, B owes \$1 million to C, and C owes \$1 million to A. If, say, B only knows her own situation, then B might need to take out a short-term loan from some party D to pay \$1 million to C (and repay the debt to D after A has paid B). If these loans were common knowledge, multilateral netting would rule out the necessity of borrowing from D.

37. Thanks are due to Matthew Braham, Martin van Hees, Niels Hermes, and Martien Lamers for discussions informing this article. I owe particular thanks to Marco Meyer and Tom Sorell for extensive written comments on an earlier version.

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